

REMARKS

Claims 1-7 have been canceled. New Claims 8-18 are active in the present application. Reconsideration is respectfully requested.

Applicants representative wishes to thank Examiner Solola for the helpful and courteous interview of September 13, 2004. As a result of the discussion it is believed that the issues in the case have been clarified and that the prosecution of the application has been materially advanced.

The present invention relates to a process for conducting esterification reactions of (meth)acrylic acid and transesterification reactions of (meth)acrylic acid ester under conditions which impede the polymerization of (meth)acrylate compounds.

Objection to Specification

The objection to the specification is believed obviated by the amendments to the text . Withdrawal of the objection is respectfully requested.

Claim Amendments

Claims 1-7 have been canceled in favor of new Claims 8-13, thereby providing support for theses new claims. Support for new Claims 14 to 18 can be found at page 5, last paragraph, the bottom of page 4, page 6, lines 22-24 and page 7, lines 4-11. In particular, it should be noted that Claim 8 differs from original Claim 1 in that it is limited to the following aspects of polymerization inhibition of (meth)acrylate material of (i) (c+b), (ii) (c), (iii) (c+a), (iv) (a), (v) (a+b) and (vi) (a+b+c). Entry of the new claims is respectfully requested.

Claim Rejection, 35 USC 112

The rejection of claims 1-7 is believed obviated by their cancellation in favor of new Claims 8-13. Language objected to by the Examiner has been deleted from the claims and multiple claim dependencies have been removed. However, as to the issue raised with respect to the metering in of (meth)acrylic acid or (meth)acrylate ester, the metering rate is dependent on both time and reactor volume parameters. The language which expresses this situation in the claims as presented is correct. Alternative language, as such was discussed at the interview, of 250 g per hour per liter of reactor volume is incorrect because it implies a ratio of a ratio. Accordingly, withdrawal of the rejection is respectfully requested.

Invention

The present invention is directed to a process of conducting esterification and transesterification of (meth)acrylic acid and (meth)acrylic acid ester compounds, respectively, under conditions that at least suppress, if not impede, the polymerization of (meth)acrylic compounds. As such, the method of the invention comprises reacting (meth)acrylic acid with an alcohol or a (meth)acrylic acid ester with an alcohol, each in the presence of a catalyst, the esterification or transesterification reaction being conducted under conditions which at least suppress the polymerization of (meth)acrylate compounds by one of the following techniques:

a) thermally treating the alcohol reactant in the absence of water before the esterification or transesterification reaction and then formulating an esterification or transesterification reaction medium containing the heat treated alcohol and a polymerization inhibitor in an amount of at least 0.2 mmol per kg of heat treated alcohol and per meq/kg of the peroxide number of the alcohol determined by the Sully method; or

b) thermally treating the alcohol reactant in the absence of water before the esterification or transesterification reaction and then conducting the esterification or transesterification reaction in a medium containing the heat treated alcohol; or

c) thermally treating the alcohol reactant in the absence of water before the esterification or transesterification reaction and then metering the (meth)acrylic acid or (meth)acrylic ester reactant into a reactor at a rate of less than 250 g per hour and liter of reactor volume which contains reaction medium comprising the thermally treated alcohol; or

d) metering the (meth)acrylic acid or (meth)acrylic ester reactant into a reactor at a rate of less than 250 g per hour and liter of reactor volume which contains a reaction medium;
or

e) metering the (meth)acrylic acid or (meth)acrylic ester reactant into a reactor at a rate of less than 250 g per hour and liter of reactor volume which contains a reaction medium comprising an alcohol and at least 0.2 mmol of polymerization inhibitor per kg of alcohol and per meq/kg of peroxide number of the alcohol determined by the Sully method

f) thermally treating the alcohol reactant in the absence of water before the esterification or transesterification reaction, formulating an esterification or transesterification reaction medium containing the heat treated alcohol and a polymerization inhibitor in an amount of at least 0.2 mmol per kg of heat treated alcohol and per meq/kg of the peroxide number of the alcohol determined by the Sully method and then metering the (meth)acrylic acid or (meth)acrylic ester reactant into a reactor at a rate of less than 250 g per hour and liter of reactor volume.

Prior Art Rejection

Claims 1-7 stand rejected based on 35 USC 103 as obvious over Tweedy, U. S. Patent 6,175,037 and Trepasso et al, U. S. Patent 5,554,785. This ground of rejection is respectfully traversed.

The Tweedy patent is relevant to the present invention, because it discloses a method of preparing (meth)acrylate esters and polyester (meth)acrylates by reacting the parent acid compound with monools or polyols in the presence of a catalyst and polymerization inhibitor. A discussion of inhibitors is provided in columns 5 and 6 of the patent, the list of inhibitors including phenothiazine which is said by the Examiner not to be taught by Tweedy (page 3, 5th last line of the Office Action). However, Tweedy does not show or suggest the five embodiments of the present invention of conducting esterification or transesterification of a (meth)acrylate compound while inhibiting the polymerization of (meth)acrylate compounds during the esterification or transesterification reaction. Accordingly, the rejection based on the Tweedy patent is believed overcome and withdrawal of the same is respectfully requested.

The Trapasso et al patent is relevant to the present invention for reasons that are similar to those discussed above concerning the Tweedy patent. That is, Trapasso et al discloses a transesterification reaction in which a starting (meth)acrylate ester is reacted with an alcohol under conditions which provide for the presence of a polymerization inhibitor as discussed in column 11 of the patent and in the examples of the disclosure. All ten examples simply mention polymerization inhibitors as present in the specific transesterification reaction media described. However, just as mentioned above, the reference does not show or suggest any of the five claimed aspects of the present invention whereby an esterification or transesterification reaction is conducted while suppressing any polymerization reactions that potentially might occur that involve

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(meth)acrylate compounds. Accordingly, the rejection based on the Trapasso et al patent is believed overcome and withdrawal of the same is respectfully requested.

It is now believed that the application is in proper condition for allowance.

Early notice to this effect is earnestly solicited.

Respectfully submitted,

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